40MKCC / 24AHA4 / 124ANS
40MKQC / 25HHA4 / 224ANS
Cassette Ductless Split System
Sizes 18 to 34

Service Manual

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SAFETY CONSIDERATIONS

Installing, starting up, and servicing air-conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location (roofs, elevated structures, etc.).

Only trained, qualified installers and service mechanics should install, start-up, and service this equipment.

Untrained personnel can perform basic maintenance functions such as cleaning coils. All other operations should be performed by trained service personnel.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

Follow all safety codes. Wear safety glasses and work gloves. Keep quenching cloth and fire extinguisher nearby when brazing. Use care in handling, rigging, and setting bulky equipment.

Read this manual thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements. Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.

⚠ WARNING

EXPLOSION HAZARD

Failure to follow this warning could result in death, serious personal injury, and/or property damage.

Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

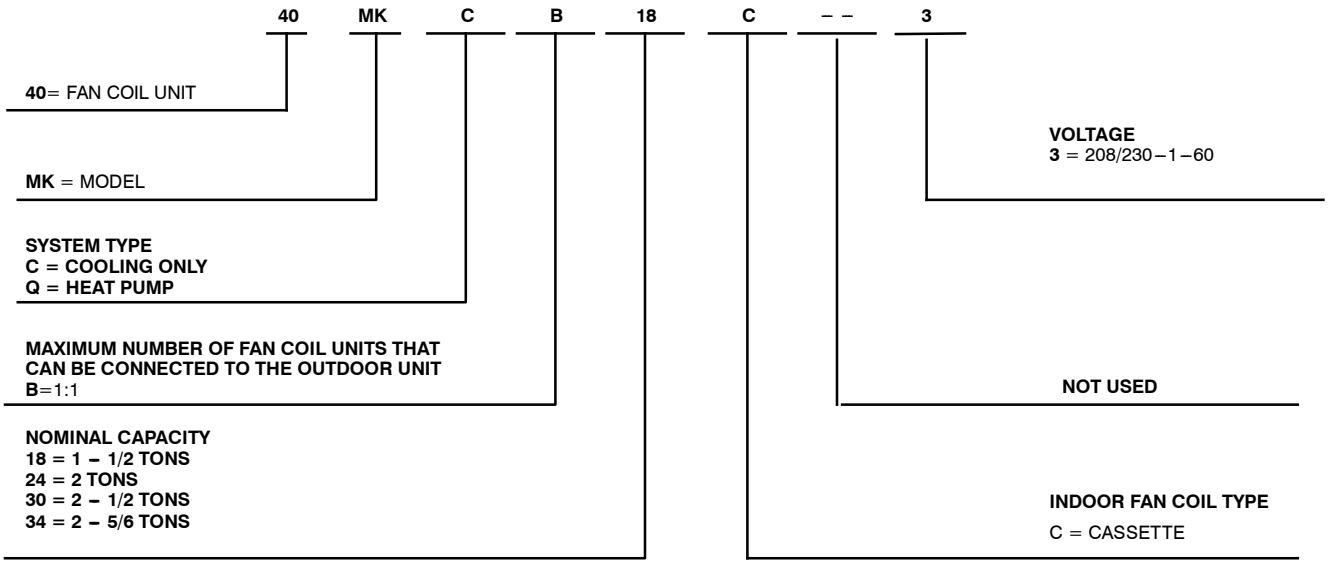
Do not bury more than 36 in. (914 mm) of refrigerant pipe in the ground. If any section of pipe is buried, there must be a 6 in. (152 mm) vertical rise to the valve connections on the outdoor units. If more than the recommended length is buried, refrigerant may migrate to the cooler buried section during extended periods of system shutdown. This causes refrigerant slugging and could possibly damage the compressor at start-up.

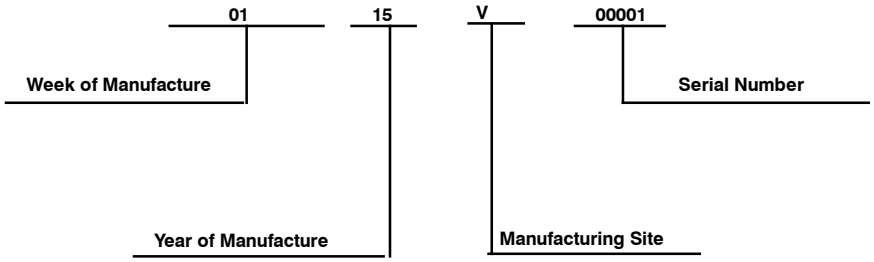
INTRODUCTION

This Service Manual provides the necessary information to service, repair, and maintain the MK family of air conditioners and heat pumps. Section 2 of this manual is an appendix with data required to perform troubleshooting. Use the Table of Contents to locate a desired topic.

MODEL / SERIAL NUMBER NOMENCLATURES

INDOOR UNIT


40 MK C B 18 C – – 3
40= FAN COIL UNIT
MK = MODEL
SYSTEM TYPE
C = COOLING ONLY
Q = HEAT PUMP
MAXIMUM NUMBER OF FAN COIL UNITS THAT CAN BE CONNECTED TO THE OUTDOOR UNIT
B=1:1
NOMINAL CAPACITY
18 = 1 – 1/2 TONS
24 = 2 TONS
30 = 2 – 1/2 TONS
34 = 2 – 5/6 TONS
VOLTAGE
3 = 208/230–1–60
NOT USED
INDOOR FAN COIL TYPE
C = CASSETTE



Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program For verification of certification for individual products, go to www.ahridirectory.org.

STANDARD FEATURES AND ACCESSORIES

Table 1—Standard Features

Ease Of Installation	
Indoor and Outdoor Compact Size	S
Outdoor Unit Wall Mounting Kit	A
Outdoor Unit Stacking Kit	A
Indoor Mounting Bracket	S
Comfort Features	
Microprocessor Controls	S
Wireless Remote Control	S
Automatic Air Sweep	S
Air Direction Control	S
Auto Restart Function	S
Cold Blow Protection On Heat Pumps	S
Turbo Mode	S
Silence Mode	S
Follow Me	S
Energy Saving Features	
Sleep Mode	S
Stop/Start Timer	S
46 °F Heating Mode (Heating Setback)	S
Safety And Reliability	
3 Minute Time Delay For Compressor	S
Over Current Protection For Compressor	S
Crankcase Heater (standard on sizes 30 and 36 Heat Pump)	A
Indoor Coil Freeze Protection	S
Indoor Coil High Temperature Protection On Heat Pumps	S
Condenser High Temperature Protection On Heat Pumps	S
Accumulator On Heat Pumps	S
Ease Of Service And Maintenance	
Cleanable Filters	S
Diagnostics	S
Liquid Line Pressure Taps	S
Suction And Discharge Pressure Taps	S
Application Flexibility	
Low Ambient Controls (-20°F) (-28.9°C)	A
3-Phase on size 34	S
Wind Baffles	A
Condensate Pumps	S
Wired Controls	A

Legend
S Standard
A Accessory

ACCESSORIES

Table 2—Accessories

Ordering No.	Description	For Models
KSACN0101AAA	Wired Remote Control	All Sizes
40MK-B01C--3	Grille/Ceiling panel	Cassette Indoor units
KSALA0801AAA	Low Ambient Control (for cooling -20F)	24AHA4/25HHA4 (208/230V)
KSALA0901AAA	Low Ambient Control (for cooling -20F)	24AHA4 (460V-3)
KAACH1401AAA	Crankcase Heater	24AHA4 Sizes 18-36 (208/230V)
KAACH1501AAA	Crankcase Heater	24AHA4 Size 36 (460V-3)
KAACH1701AAA	Crankcase Heater	25HHA4 Size 24 (208/230V)
KAAWS0101AAA	Winter Start Kit (for low ambient on cooling only systems)	24AHA4 All Sizes
KHAIR0201AAA	Isolation Relay (Required when using Low Ambient cooling with HP)	25HHA4 All Sizes
KSAHS1501AAA	Hard Start Kit (Capacitor & Relay)	24AHA4/25HHA4 (208/230V-1)
53DS-900---087	Wind Baffle	24AHA4 Sizes 18 & 24; 25HHA4 Size 24
53DS-900---071	Wind Baffle	24AHA4/25HHA4 Sizes 30 & 36
53DS-900---075	Stacking Kit	24AHA4 Sizes 18, 24
53DS-900---076	Stacking Kit	24AHA4 Sizes 30, 36
53DS-900---077	Wall Mount Kit	24AHA4 Sizes 18, 24 and 25HHA4 Size 24
53DS-900---078	Wall Mount Kit	24AHA4/25HHA4 Sizes 30, 36
KAALS0201LLS	Liquid Line Solenoid for Cooling Only	24AHA4 All Sizes - Required for Long Line Applications
KHALS0401LLS	Liquid Line Solenoid for Heat Pump	25HHA4 All Sizes - Required for Long Line Applications

INDOOR UNIT ACCESSORIES

Grille

To maximize shipping efficiency, the grille for the in-ceiling cassette is set up as an accessory.

NOTE: Grille is required.

Wired Remote Controller

For applications where the use of wireless remote control is not desired, the MK units can be controlled by means of a wired wall-mounted control with an LCD display.

Fig. 1 – Wall Mounted Control with LCD Display

SPECIFICATIONS

Table 3—Cooling Only

			COOLING ONLY					
System	**Size**		**18**	**24**	**30**	**34**	**34**	**34**
	Outdoor Model		24AHA418A003 124ANS018000	24AHA424A003 124ANS024000	24AHA430A003 124ANS030000	24AHA436A003 124ANS036000	24AHA436A005 124APS036000	24AHA436A006 124AES036000
	Indoor Model		40MKCB18C--3	40MKCB34C--3	40MKCB34C--3	40MKCB34C--3	40MKCB34C--3	40MKCB34C--3
	Energy Star		NO	NO	NO	NO	NO	NO
Performance	Cooling Rated Capacity	Btu/h	17,100	23,800	30,000	34,200	34,200	34,200
	SEER		14	14	14	14	14	14
	EER		12.2	12.2	12.2	12.2	12.2	12.2
Controls	Wireless Remote Controller (°F/°C Convertible)		Standard	Standard	Standard	Standard	Standard	Standard
	Wired Remote Controller (°F/°C Convertible)		Optional	Optional	Optional	Optional	Optional	Optional
Operating Range	Cooling Outdoor DB Min - Max	°F	55~125 (-20 F w / Low-Ambient Kit)	55~125 (-20 F w / Low-Ambient Kit)	55~125 (-20 F w / Low-Ambient Kit)	55~125 (-20 F w / Low-Ambient Kit)	55~125 (-20 F w / Low-Ambient Kit)	55~125 (-20 F w / Low-Ambient Kit)
	Cooling Indoor DB Min -Max	°F	64~90	64~90	64~90	64~90	64~90	64~90
Piping	Total Piping Length**	Ft.	200'	200'	200'	200'	200'	200'
	Drop (OD above ID)	Ft.	200'	200'	200'	200'	200'	200'
	Lift (OD below ID)	Ft.	65'	65'	65'	65'	65'	65'
	Outdoor Pipe Connection Size - Liquid*	In.	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
	Outdoor Pipe Connection Size - Suction	In.	5/8"	3/4"	3/4"	7/8"	7/8"	7/8"
	Indoor Pipe Connection Size - Liquid	In.	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
	Indoor Pipe Connection Size - Suction	In.	5/8"	3/4"	3/4"	3/4"	3/4"	3/4"
Refrigerant	Type		R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
	Design Pressure	PSIG	550	550	550	550	550	550
	Metering Device		Type B Accurator	Type B Accurator	Type B Accurator	Type B Accurator	Type B Accurator	Type B Accurator
	Charge	Lb.	6.4	6.5	8.6	8.9	8.9	8.9
Outdoor Coil	Face Area	Sq. Ft.	7.3	7.3	12.1	12.1	12.1	12.1
	No. Rows		2	2	2	2	2	2
	Fins per inch		20	20	20	20	20	20
	Circuits		3	3	3	3	3	3
Indoor Coil	Face Area (sq. ft.)	Sq. Ft.	3.6	5.6	5.6	5.6	5.6	5.6
	No. Rows		2	3	3	3	3	3
	Fins per inch		18	18	18	18	18	18
	Circuits		8	12	12	12	12	12
Compressor	Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
	Model		ZP16K6E-PFV-130	ZP20K6E-PFV-130	ZP25K5E-PFV-130	ZP29K5E-PFV-130	ZP29K5E-TF5-130	ZP29K5E-TFD-130
Electrical	Outdoor Voltage, Phase, Cycle	V/Ph/Hz	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-3-60	460-3-60
	Indoor Voltage, Phase, Cycle	V/Ph/Hz	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
	Power Supply		Indoor and outdoor units have dedicated power supply	Indoor and outdoor units have dedicated power supply	Indoor and outdoor units have dedicated power supply	Indoor and outdoor units have dedicated power supply	Indoor and outdoor units have dedicated power supply	Indoor and outdoor units have dedicated power supply
	MCA (Outdoor)	A.	11.8	14.1	18.3	18.8	12.5	7.6
	MOCP - Fuse Rating (Outdoor)	A.	20	25	30	30	20	15
	MCA (Indoor)	A.	1	1	1	1	1	1
	MOCP - Fuse Rating (Indoor)	A.	15	15	15	15	15	15
Outdoor	Unit Width	In.	36.9	36.9	44.5	44.5	44.5	44.5
	Unit Height	In.	31.1	31.1	37.1	37.1	37.1	37.1
	Unit Depth	In.	14.6	14.6	17.1	17.1	17.1	17.1
	Net Weight	Lbs.	146	148	183	184	184	184
	Airflow	CFM	1,285	1,285	1,900	2,615	2,615	2,615
Indoor	Unit Width Body	In.	33.1	33.1	33.1	33.1	33.1	33.1
	Unit Height Body	In.	33.1	33.1	33.1	33.1	33.1	33.1
	Unit Depth Body	In.	11.3	11.3	11.3	11.3	11.3	11.3
	Net Weight Body	Lbs.	54.0	68.6	68.6	68.6	68.6	68.6
	Unit Width Grille	In.	37.4	37.4	37.4	37.4	37.4	37.4
	Unit Height Grille	In.	37.4	37.4	37.4	37.4	37.4	37.4
	Unit Depth Grille	In.	2.2	2.2	2.2	2.2	2.2	2.2
	Net Weight Grille	Lbs.	11.0	11.0	11.0	11.0	11.0	11.0
	Number of Fan Speeds		3	3	3	3	3	3
	Airflow (lowest to highest)	CFM	370/450/630	750/820/1130	750/820/1130	750/820/1130	750/820/1130	750/820/1130
	Sound Pressure (lowest to highest)	dB(A)	39/43/47	44/48/53	44/48/53	44/48/53	44/48/53	44/48/53
	Air throw Data	Ft.	15	16	16	16	16	16

* Liquid line needs to be insulated

** Refer to Ductless Split System Long Line Guide for additional information. Long Line accessories required beyond 80 ft (24.4 m).

SPECIFICATIONS (CONT)

Table 4—Heat Pump

			HEAT PUMP				
System	**Size**		**24**	**30**	**34**	**34**	**34**
	Outdoor Model		25HHA424A003 224ANS030000	25HHA430A003 224ANS036000	25HHA436A003 224APS036000	25HHA436A005 224AES036000	25HHA436A006 224ANS048000
	Indoor Model		40MKQB34C--3	40MKQB34C--3	40MKQB34C--3	40MKQB34C--3	40MKQB34C--3
	Energy Star		NO	NO	NO	NO	NO
Performance	Cooling Rated Capacity	Btu/h	23,400	28,400	32,600	32,600	32,600
	SEER		14	14	14	14	14
	EER		11.2	12.2	12.2	12.2	12.2
	Heating Rated Capacity	Btu/h	20,200	29,000	33,000	33,000	33,000
	HSPF		8.2	8.2	8.2	8.2	8.2
	COP	W/W	4.24	4.1	3.94	3.94	3.94
Controls	Wireless Remote Controller (°F/°C Convertible)		Standard	Standard	Standard	Standard	Standard
	Wired Remote Controller (°F/°C Convertible)		Optional	Optional	Optional	Optional	Optional
Operating Range	Cooling Outdoor DB Min - Max	°F	55~125 (-20°F w / Low-Ambient Kit)	55~125 (-20°F w / Low-Ambient Kit)	55~125 (-20°F w / Low-Ambient Kit)	55~125 (-20°F w / Low-Ambient Kit)	55~125 (-20°F w / Low-Ambient Kit)
	Heating Outdoor DB Min - Max	°F	17~75	17~75	17~75	17~75	17~75
	Cooling Indoor DB Min -Max	°F	64~90	64~90	64~90	64~90	64~90
	Heating Indoor DB Min -Max	°F	32~80	32~80	32~80	32~80	32~80
Piping	Total Piping Length**	Ft.	200'	200'	200'	200'	200'
	Drop (OD above ID)	Ft.	200'	200'	200'	200'	200'
	Lift (OD below ID)	Ft.	65'	65'	65'	65'	65'
	Outdoor Pipe Connection Size - Liquid	In.	3/8"	3/8"	3/8"	3/8"	3/8"
	Outdoor Pipe Connection Size - Suction	In.	3/4"	3/4"	7/8"	7/8"	7/8"
	Indoor Pipe Connection Size - Liquid*	In.	3/8"	3/8"	3/8"	3/8"	3/8"
	Indoor Pipe Connection Size - Suction	In.	3/4"	3/4"	3/4"	3/4"	3/4"
Refrigerant	Type		R-410A	R-410A	R-410A	R-410A	R-410A
	Design Pressure	PSIG	550	550	550	550	550
	Metering Device		Type B Accurator				
	Charge	Lb.	7.7	12.1	12.3	12.3	12.3
Outdoor Coil	Face Area	Sq. Ft.	7.3	12.1	12.1	12.1	12.1
	No. Rows		2	2	2	2	2
	Fins per inch		20	20	20	20	20
	Circuits		3	6	5	5	5
Indoor Coil	Face Area (sq. ft.)	Sq. Ft.	5.6	5.6	5.6	5.6	5.6
	No. Rows		3	3	3	3	3
	Fins per inch		18	18	18	18	18
	Circuits		12	12	12	12	12
Compressor	Type		Scroll	Scroll	Scroll	Scroll	Scroll
	Model		ZP21K5E-PFV-130	ZP24K5E-PFV-130	ZP29K5E-PFV-130	ZP29K5E-TF5-130	ZP29K5E-TFD-130
Electrical	Outdoor Voltage, Phase, Cycle	V/Ph/ Hz	208/230-1-60	208/230-1-60	208/230-1-60	208/230-3-60	460-3-60
	Indoor Voltage, Phase, Cycle	V/Ph/ Hz	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
	Power Supply		Indoor and outdoor units have dedicated power supply				
	MCA (Outdoor)	A.	16.5	17.2	19	12.8	7.6
	MOCP - Fuse Rating (Outdoor)	A.	25	30	30	20	15
	MCA (Indoor)	A.	1	1	1	1	1
	MOCP - Fuse Rating (Indoor)	A.	15	15	15	15	15
Outdoor	Unit Width	In.	36.9	44.5	44.5	44.5	44.5
	Unit Height	In.	31.1	37.1	37.1	37.1	37.1
	Unit Depth	In.	14.6	17.1	17.1	17.1	17.1
	Net Weight	Lbs.	161	196	197	197	197
	Airflow	CFM	1,285	2,615	2,615	2,615	2,615
Indoor	Unit Width Body	In.	33.1	33.1	33.1	33.1	33.1
	Unit Height Body	In.	33.1	33.1	33.1	33.1	33.1
	Unit Depth Body	In.	11.3	11.3	11.3	11.3	11.3
	Net Weight Body	Lbs.	68.6	68.6	68.6	68.6	68.6
	Unit Width Grille	In.	37.4	37.4	37.4	37.4	37.4
	Unit Height Grille	In.	37.4	37.4	37.4	37.4	37.4
	Unit Depth Grille	In.	2.2	2.2	2.2	2.2	2.2
	Net Weight Grille	Lbs.	11.0	11.0	11.0	11.0	11.0
	Number of Fan Speeds		3	3	3	3	3
	Airflow (lowest to highest)	CFM	750/820/1130	750/820/1130	750/820/1130	750/820/1130	750/820/1130
	Sound Pressure (lowest to highest)	dB(A)	44/48/53	44/48/53	44/48/53	44/48/53	44/48/53
	Air throw Data	Ft.	16	16	16	16	16

* Liquid line needs to be insulated

** Refer to Ductless Split System Long Line Guide for additional information. Long Line accessories required beyond 80 ft (24.4 m).

DIMENSIONS - INDOOR

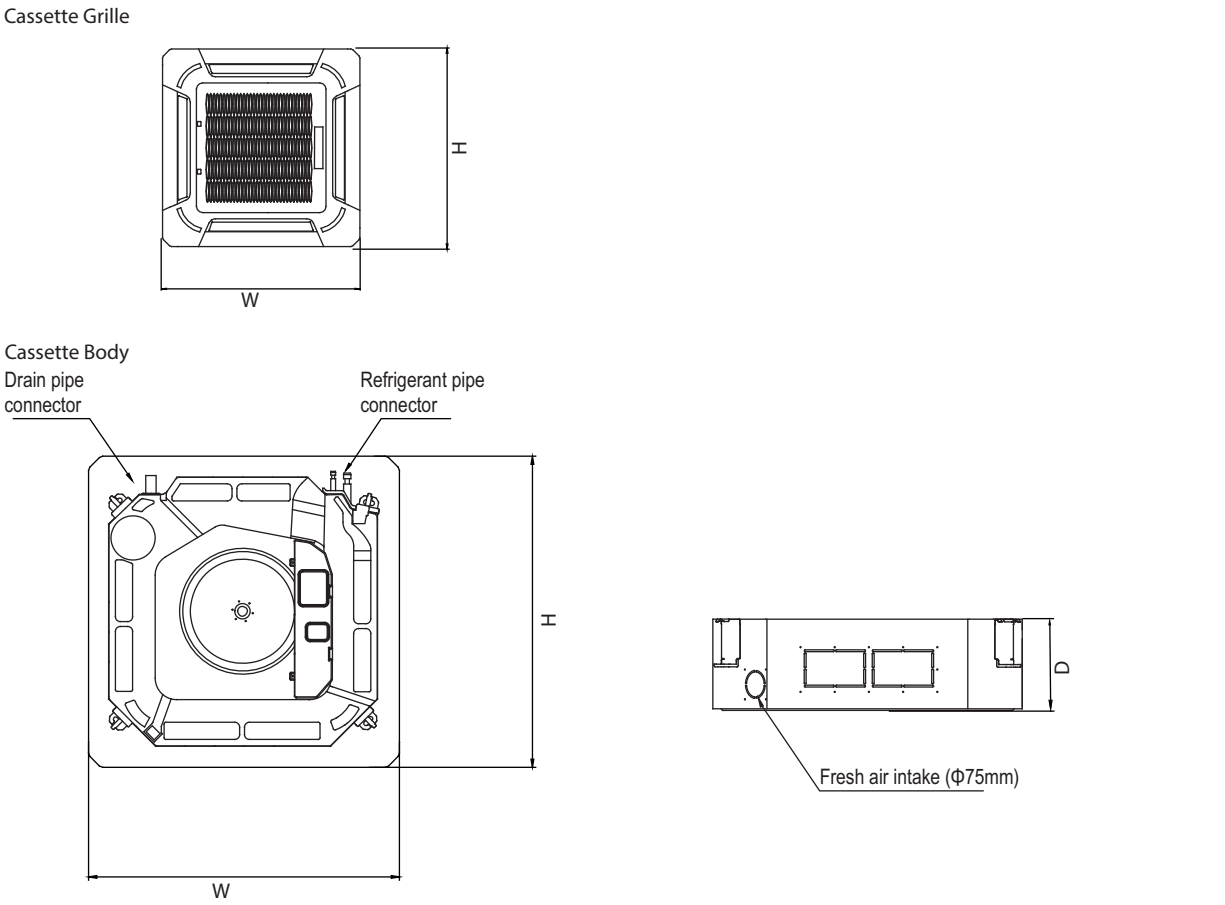


Fig. 2 – 40MKCC, 40MKQ**C Unit and Panel Dimensions**

Table 5—Dimensions Indoor

Indoor Unit Size BTU/Hr	Height (H) in (mm)	Width (W) in (mm)	Depth (D) in (mm)	Operating Weight lb (kg)
18K	33.1 (840)	33.1 (840)	8.1 (205)	54.0 (24.5)
24K – 34K	33.1 (840)	33.1 (840)	11.3 (287)	68.6 (31.1)
Cassette Panel	37.4 (950)	37.4 (950)	2.2 (55)	11.0 (5)

DIMENSIONS - OUTDOOR

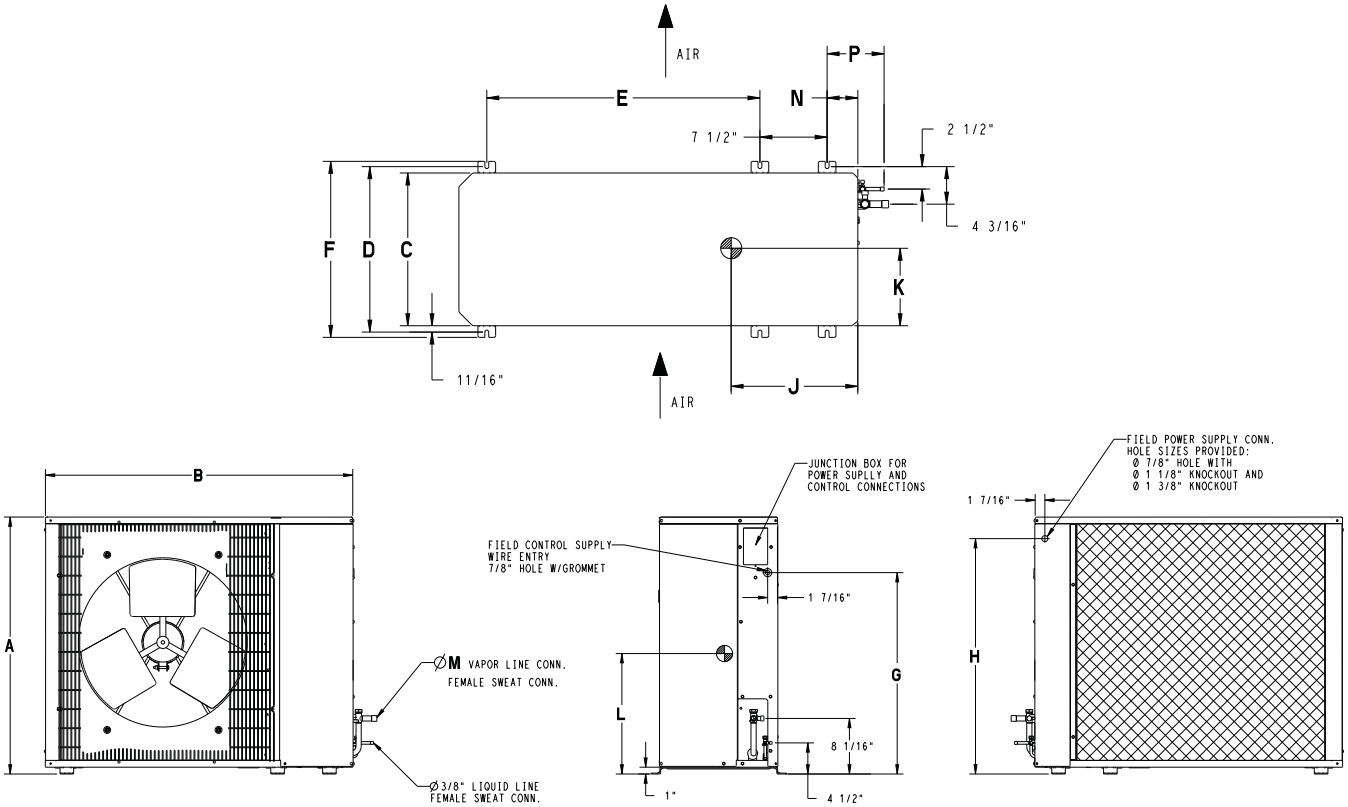


Fig. 3 – Outdoor Unit Dimensions

Table 6—Dimensions Outdoor

	Dimensions in (mm)															OPERATING WEIGHT lbs (kg)
	UNIT	A	B	C	D	E	F	G	H	J	K	L	M	N	P	
Cooling Only	24AHA418	31.1 (791)	36.9 (938)	14.6 (370)	16 (406)	23.4 (595)	17.2 (437)	23.1 (587)	28.1 (713)	13 (330)	6.6 (168)	11.3 (286)	0.6 (16)	2.9 (73)	5.8 (148)	146 (66)
	24AHA424	31.1 (791)	36.9 (938)	14.6 (370)	16 (406)	23.4 (595)	17.2 (437)	23.1 (587)	28.1 (713)	14 (356)	6.8 (171)	11.6 (295)	0.8 (19)	2.9 (73)	5.8 (148)	148 (67)
	24AHA430	37.1 (943)	44.5 (1130)	17.1 (433)	18.4 (468)	30.5 (775)	19.6 (498)	29.1 (740)	34.1 (865)	13.7 (348)	8.1 (206)	15.9 (403)	0.8 (19)	3.4 (86)	6.4 (162)	183 (83)
	24AHA436	37.1 (943)	44.5 (1130)	17.1 (433)	18.4 (468)	30.5 (775)	19.6 (498)	29.1 (740)	34.1 (865)	13.7 (348)	8.1 (206)	15.9 (403)	0.9 (22)	3.4 (86)	6.4 (162)	184 (83)
Heat Pump	25HHA424	31.1 (791)	36.9 (938)	14.6 (370)	16 (406)	23.4 (595)	17.2 (437)	23.1 (587)	28.1 (713)	14 (356)	6.8 (171)	11.6 (295)	0.8 (19)	2.9 (73)	4.9 (125)	161 (73)
	25HHA430	37.1 (943)	44.5 (1130)	17.1 (433)	18.4 (468)	30.5 (775)	19.6 (498)	29.1 (740)	34.1 (865)	13.7 (348)	8.1 (206)	15.9 (403)	0.8 (19)	3.4 (86)	5.5 (140)	196 (89)
	25HHA436	37.1 (943)	44.5 (1130)	17.1 (433)	18.4 (468)	30.5 (775)	19.6 (498)	29.1 (740)	34.1 (865)	13.7 (348)	8.1 (206)	15.9 (403)	0.9 (22)	3.4 (86)	5.5 (140)	197 (89)

NOTE: Dimensions shown in feet-inches. Dimensions in ( ) are millimeters.

CLEARANCES - INDOOR

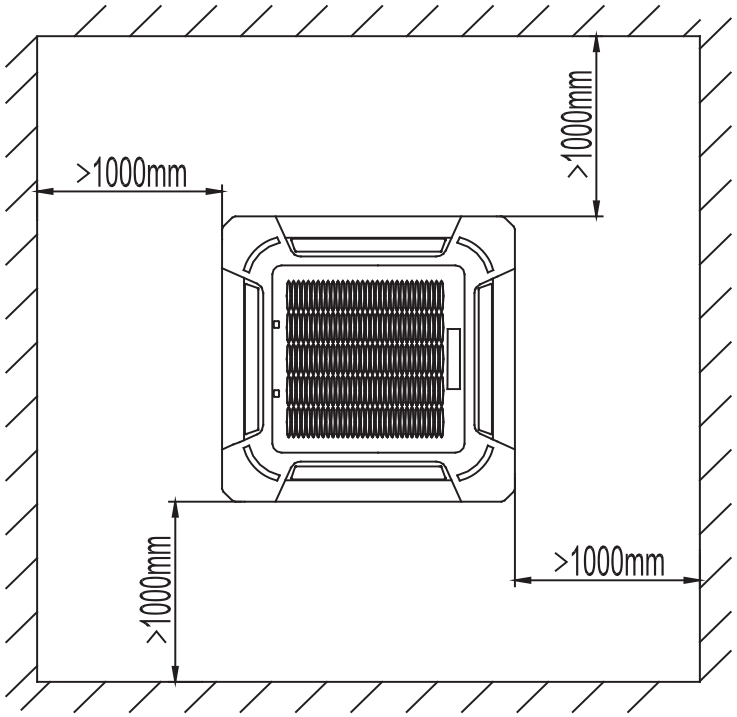


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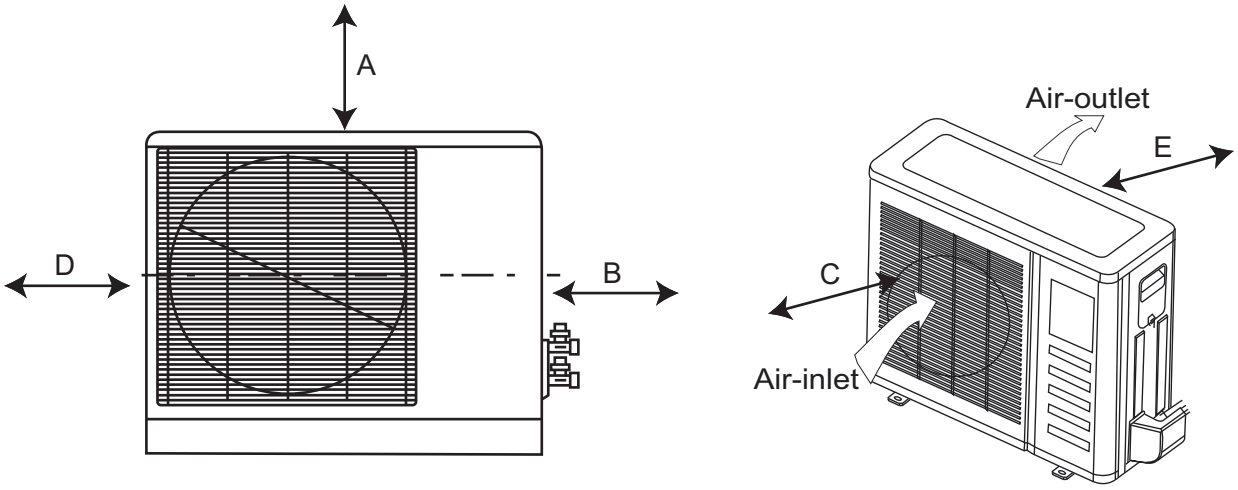
Fig. 4 – 40MKCC, 40MKQ**C Unit Clearance**

CLEARANCES - OUTDOOR



A08436

Fig. 5 – Outdoor Unit Clearance

Table 7—Clearances Indoor

UNIT	Coil Facing Wall - in. (mm)	Fan Facing Wall - in. (mm)
A	24 (610)	24 (610)
B	24 (610)	24 (610)
C	20 (508)	6 (152)
D	6 (152)	8 (203)
E	6 (152)	20 (508)

ELECTRICAL DATA

Table 8—24AHA4/124ANS Electrical Data

Unit Size - voltage series	V/PH	OPER VOLTS*		COMP		FAN	MCA	MAX FUSE** or CKT BRK AMPS
		MAX	MIN	LRA	RLA	FLA		
18-30	208/230/1	253	197	56.3	9.0	0.50	11.8	20
24-30				62.9	10.9	0.50	14.1	25
30-30				73.0	14.1	0.70	18.3	30
36-30				77.0	14.1	1.20	18.8	30
36-50	208/230/3	253	197	71.0	9.0	1.20	12.5	20
36-60	460/3	506	414	38.0	5.6	0.60	7.6	15

Table 9—25HHA4/224ANS Electrical Data

Unit Size Voltage Series	V/PH	OPER VOLTS		COMP		FAN	MCA	MAX FUSE** or CKT BRK AMPS
		MAX	MIN	LRA	RLA	FLA		
24-30	208/230/1	253	197	58.3	12.8	0.50	16.5	25
30-30				64.0	12.8	1.20	17.2	30
36-30				77.0	14.2	1.20	19.0	30
36-50	208/230/3	253	197	71.0	9.3	1.20	12.8	20
36-60	460/3	506	414	38.0	5.6	0.60	7.6	15

Table 10—40MKCBC Electrical Data**

Indoor Unit Size BTU/Hr	V-Ph-Hz	Voltage Range		Fan	Power	
		Min (V)	Max (V)	FLA (A)	Min Ckt Amp (A)	Max Fuse CB Amp (A)
18K	208–230 - 1 - 60	187	253	0.332	1	15
24K – 34K	208–230 - 1 - 60	187	253	0.8	1	15

Table 11—40MKQBC Electrical Data**

Indoor Unit Size BTU/Hr	V-Ph-Hz	Voltage Range		Fan	Power	
		Min (V)	Max (V)	FLA (A)	Min Ckt Amp (A)	Max Fuse CB Amp (A)
24K – 34K	208–230 - 1 - 60	187	253	0.8	1	15

LEGEND
FLA – Full Load Amps
HACR– Heating, Air Conditioning, Refrigeration
LRA– Locked Rotor Amps
NEC– National Electrical Code
RLA– Rated Load Amps (compressor)
*Permissible limits of the voltage range at which the unit will operate satisfactorily
****Time–Delay fuse.**
Complies with 2007 requirements of ASHRAE Standards 90.1

POWER AND CONNECTING CABLES - FIELD SUPPLIED

Recommended Connection Method for Power and Communication Wiring (To minimize communication wiring interference)

Power Wiring:

The main power is supplied to both, the indoor and the outdoor units. The field supplied connecting cable consists of three (3) wires. Two wires are high voltage AC power and one is a ground wire.

Consult your local building codes and the NEC (National Electrical Code) or CEC (Canadian Electrical Code) for special requirements.

All wires must be sized per NEC or CEC and local codes. Use Electrical Data table MCA (minimum circuit amps) and MOCP (maximum over current protection) to correctly size the wires and the disconnect fuse or breakers respectively.

Per caution note, only copper conductors with a minimum 300 volt rating and 2/64-inch thick insulation must be used.

Communication Wiring:

A separate shielded copper conductor only, with a minimum 300 volt rating and 2/64-inch thick insulation, must be used as the communication wire from the outdoor unit to the indoor unit. To minimize voltage drop of the communication wire, use the wire size and maximum lengths shown in table 12.

Table 12—Maximum Lengths

Wire Size	Length ft. (m)
18AWG	50 ft. (15 m)
16AWG	50 ft. (15 m) to 100 ft. (30 m)

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

- Wires should be sized based on NEC and local codes.
- Use copper conductors only with a minimum 300 volt rating and 2/64-inch thick insulation.

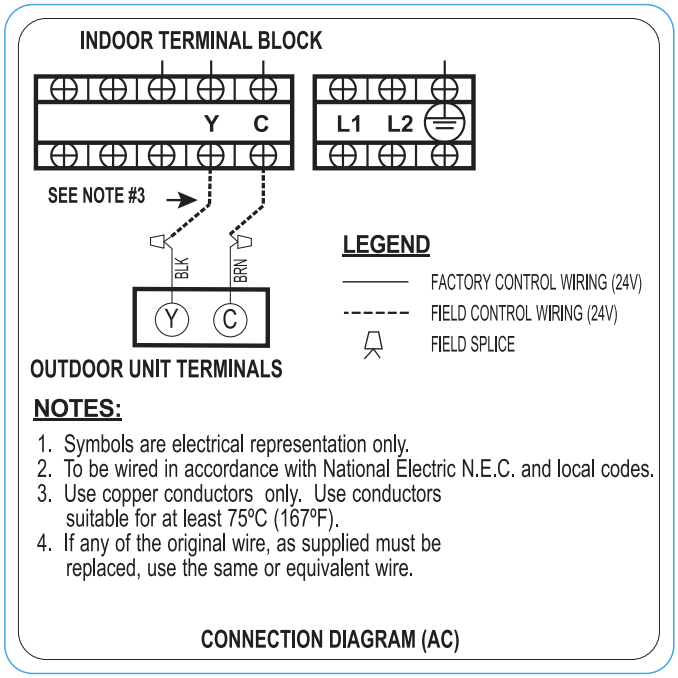
⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

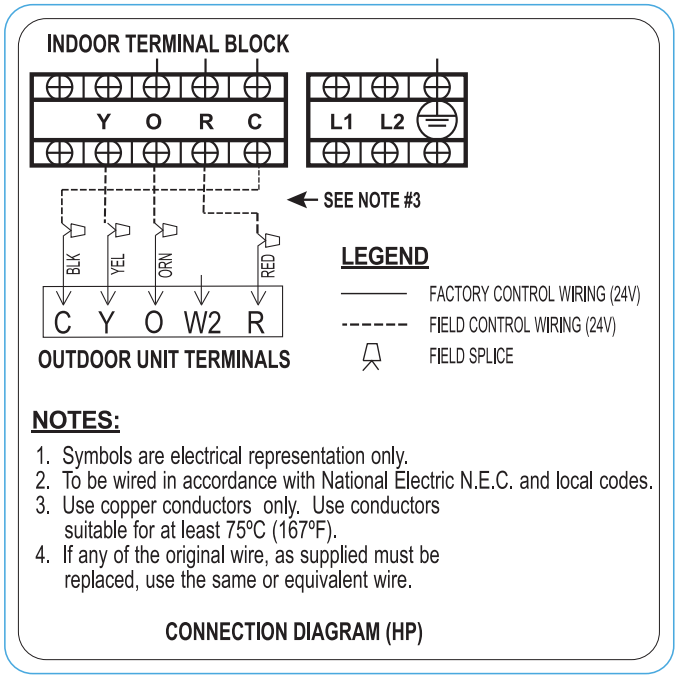
- Be sure to comply with local codes while running wire from indoor unit to outdoor unit.
- Every wire must be connected firmly. Loose wiring may cause terminal to overheat or result in unit malfunction. A fire hazard may also exist. Therefore, be sure all wiring is tightly connected.
- No wire should be allowed to touch refrigerant tubing, compressor or any moving parts.
- Disconnecting means must be provided and shall be located within sight and readily accessible from the air conditioner.
- Connecting cable with conduit shall be routed through hole in the conduit panel.

CONNECTION DIAGRAMS


INDOOR TERMINAL BLOCK
Y C
L1 L2
SEE NOTE #3
BLK
BRN
Y
C
OUTDOOR UNIT TERMINALS
LEGEND
FACTORY CONTROL WIRING (24V)
FIELD CONTROL WIRING (24V)
FIELD SPLICE
NOTES:
1. Symbols are electrical representation only.
2. To be wired in accordance with National Electric N.E.C. and local codes.
3. Use copper conductors only. Use conductors suitable for at least 75ºC (167ºF).
4. If any of the original wire, as supplied must be replaced, use the same or equivalent wire.
CONNECTION DIAGRAM (AC)

A150280

Fig. 6 – 40MKCBC/24AHA4 or 124ANS Connecting Diagram**


INDOOR TERMINAL BLOCK
Y O R C
L1 L2
SEE NOTE #3
BLK
YEL
ORN
RED
C Y O W2 R
OUTDOOR UNIT TERMINALS
LEGEND
FACTORY CONTROL WIRING (24V)
FIELD CONTROL WIRING (24V)
FIELD SPLICE
NOTES:
1. Symbols are electrical representation only.
2. To be wired in accordance with National Electric N.E.C. and local codes.
3. Use copper conductors only. Use conductors suitable for at least 75ºC (167ºF).
4. If any of the original wire, as supplied must be replaced, use the same or equivalent wire.
CONNECTION DIAGRAM (HP)

A150282

Fig. 7 – 40MKQBC/25HHA4 or 224ANS Connecting Diagram**

Notes:

1. Do not use thermostat wire for any connection between indoor and outdoor units.
2. All connections between indoor and outdoor units must be as shown. **The connections are sensitive to polarity and will result in a fault code.**

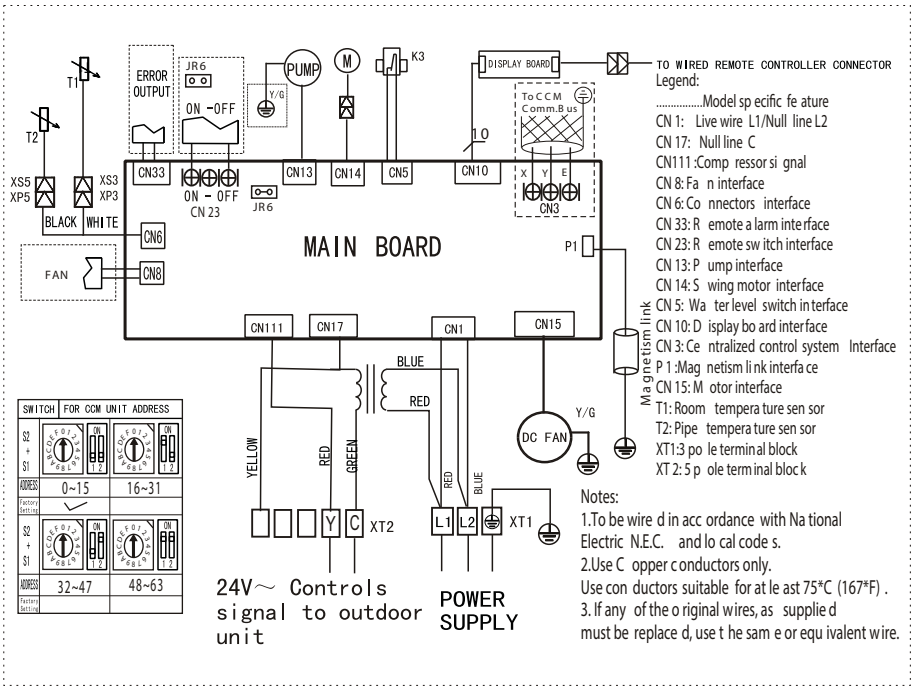


Fig. 8 – 40MKCC Wiring Diagram**

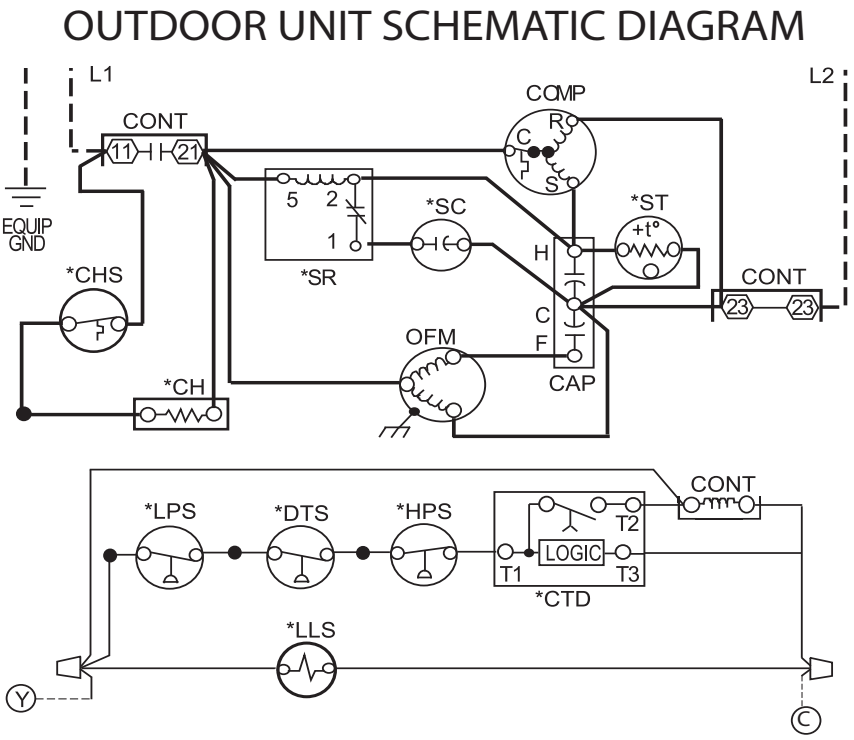


Fig. 9 – 24AHA4/124ANS Wiring Diagram 208/230V 1 Phase

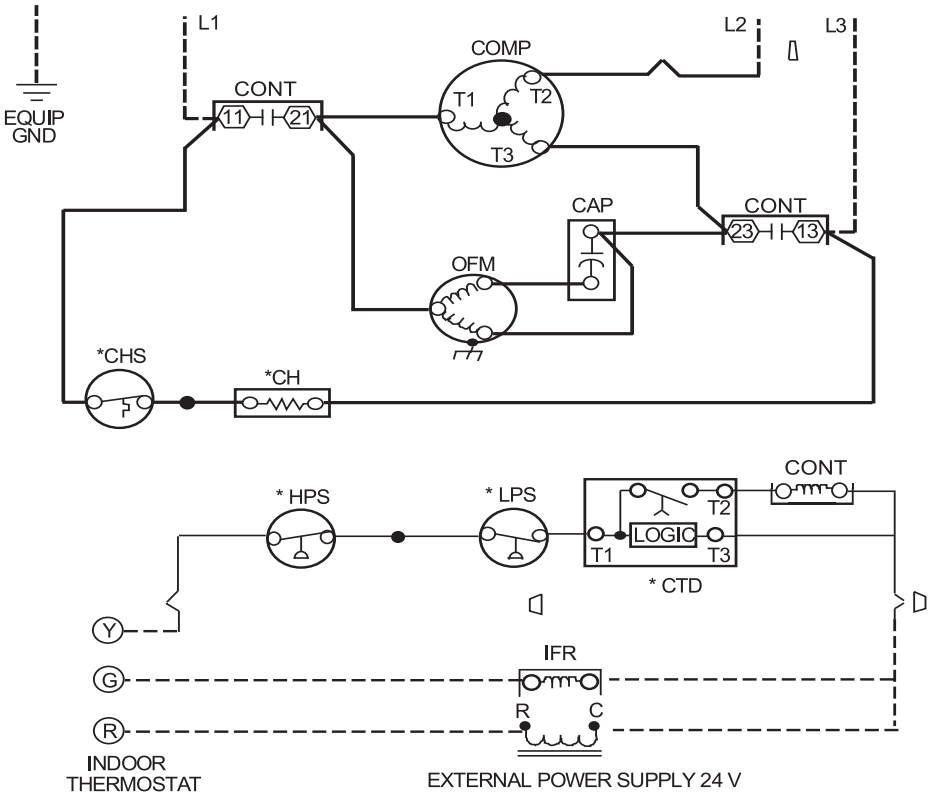


Fig. 10 – 24AHA4/124ANS Wiring Diagram 208/230 - 460V 3 Phase

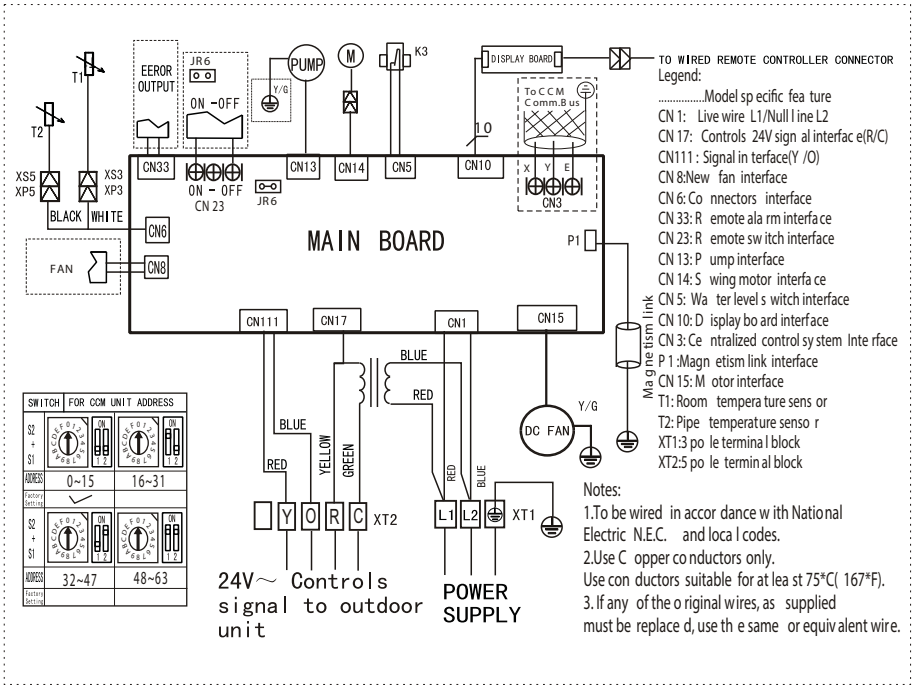


Fig. 11 – 40MKQC Wiring Diagram**

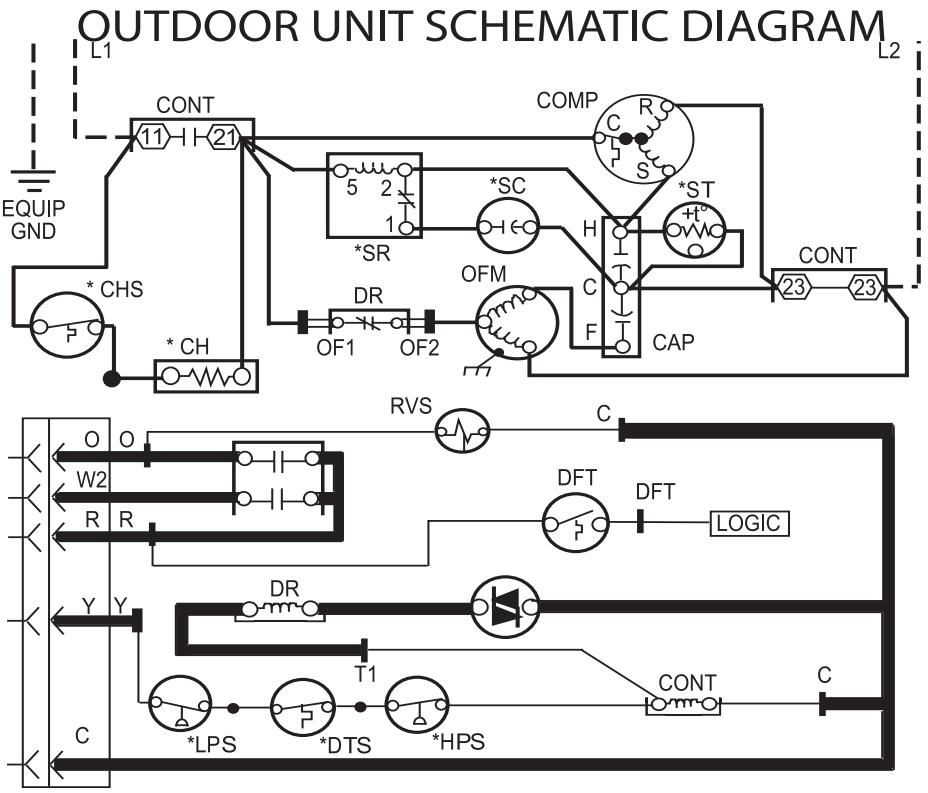


Fig. 12 – 25HHA4/224ANS Wiring Diagram 208/230V 1 Phase

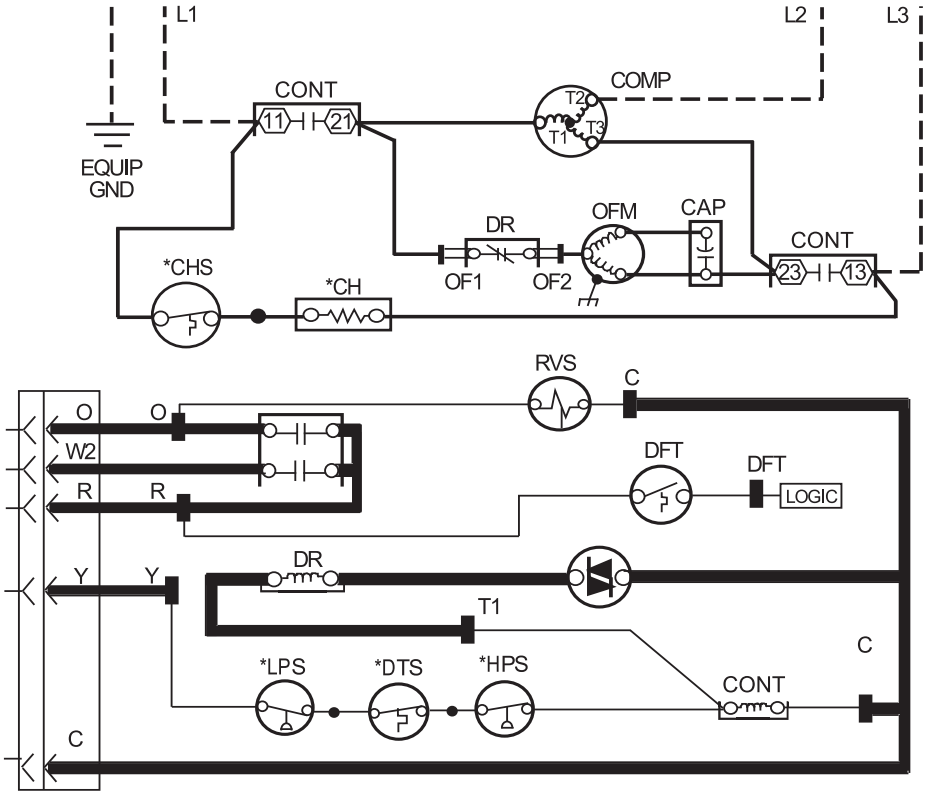


Fig. 13 – 25HHA4/224ANS Wiring Diagram 208/230V 3 Phase

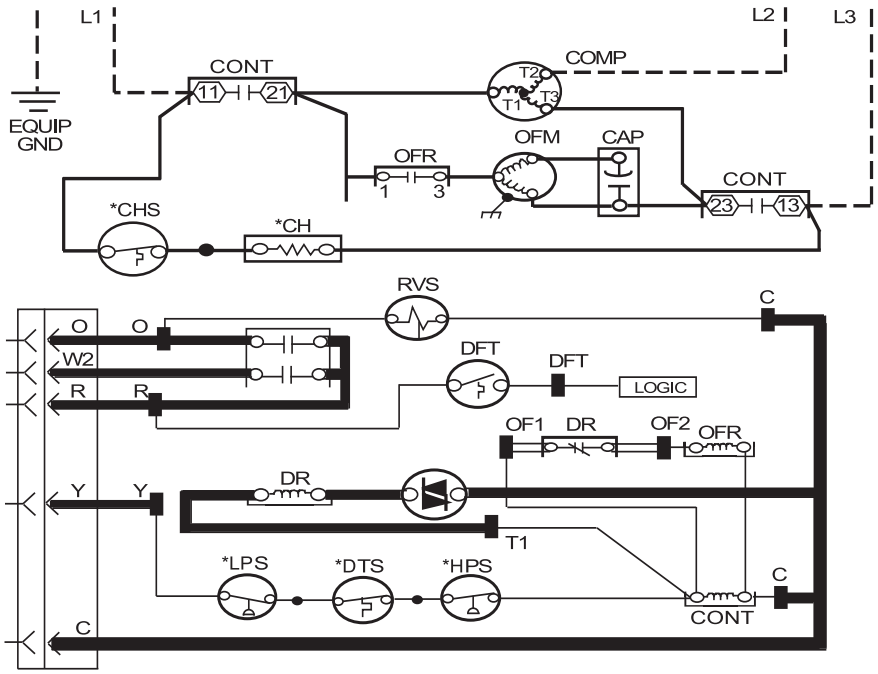


Fig. 14 – 25HHA4/224ANS Wiring Diagram 460V 3 Phase

REFRIGERATION CYCLE DIAGRAMS

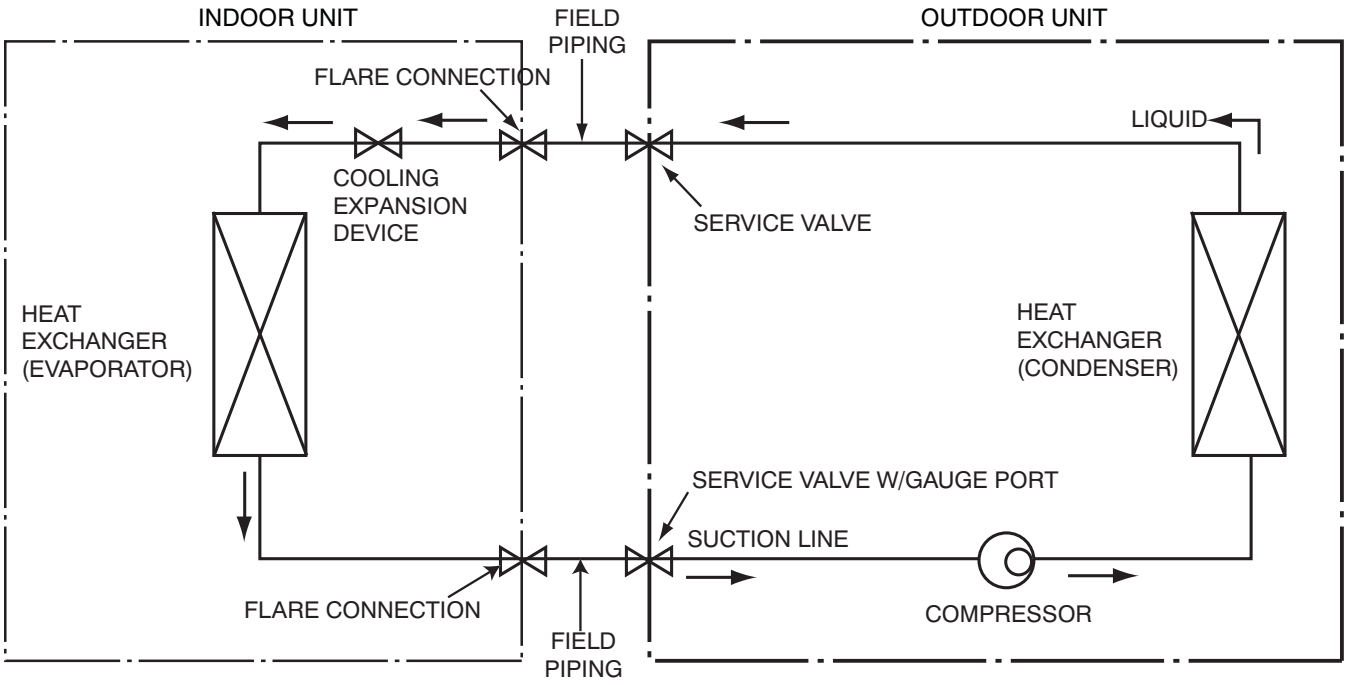


Fig. 15 – Cooling Only

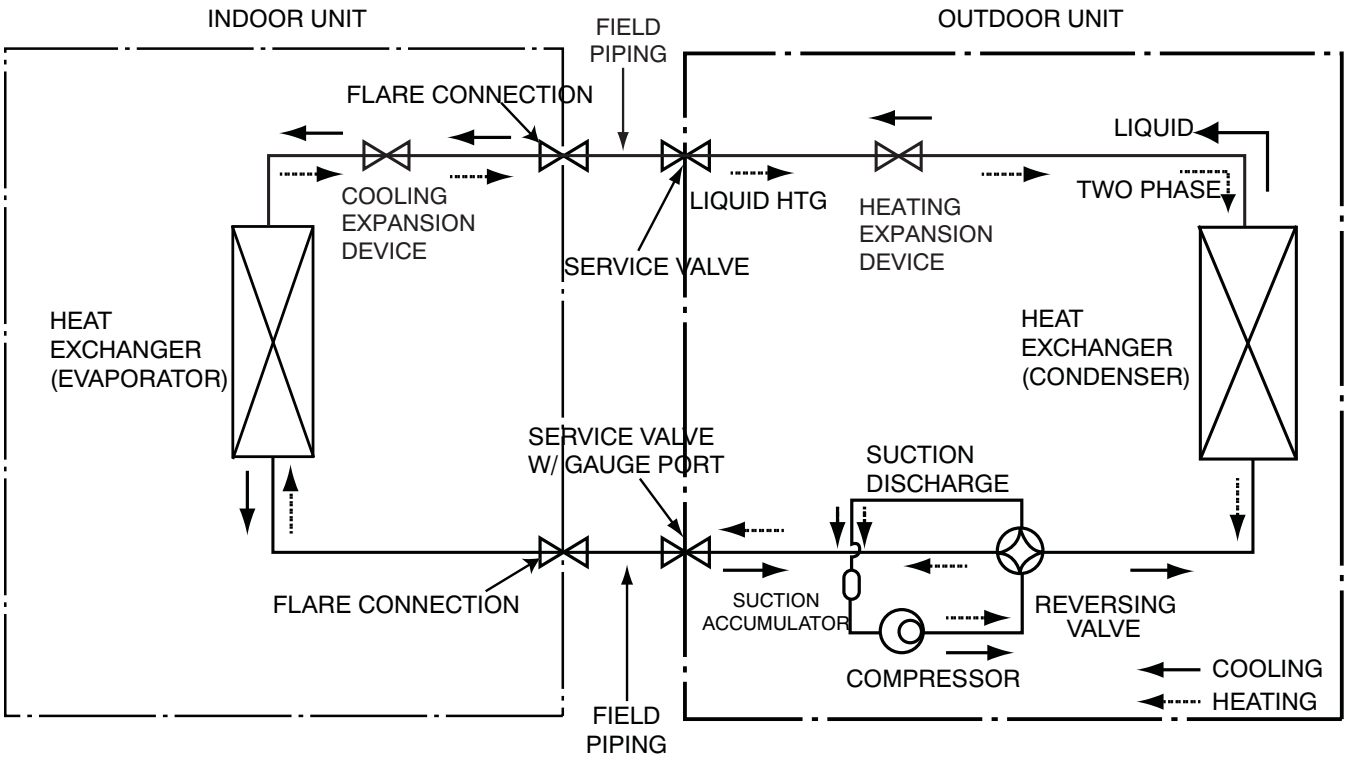


Fig. 16 – Heat Pumps

REFRIGERANT LINES

General refrigerant line sizing:

1 The outdoor units are shipped with a full charge of R410A refrigerant. All charges, line sizing, and capacities are based on runs of 25 ft. (7.6 m). For runs over 25 ft. (7.6 m), refer to the *Residential Long Line Guide*.

2 Minimum refrigerant line length between the indoor and outdoor units is 10 ft. (3 m).

3 Refrigerant lines should not be buried in the ground. If it is necessary to bury the lines, not more than 36-in (914 mm) should be buried. Provide a minimum 6-in (152 mm) vertical rise to the service valves to prevent refrigerant migration.

4 Both lines must be insulated. Use a minimum of 1/2-in. (12.7 mm) thick insulation. Closed-cell insulation is recommended in all long-line applications.

5 Special consideration should be given to isolating interconnecting tubing from the building structure. Isolate the tubing so that vibration or noise does not transmit into the structure.

IMPORTANT: **Both refrigerant lines must be insulated separately.**

- The following maximum lengths are allowed:

Table 13 – Maximum Refrigerant Line Lengths

Unit Size	Max Line Length* ft(m	Max Elevation (ID over OD) ft (m)	Max Elevation (OD over ID) ft (m)
18K-34K	250 (76.2)	65 (19.8)	200 (61)

Note: **For lengths greater than 25 ft. (7.6 m), refer to the *Residential Long Line Guide*.**

*Maximum actual length not to exceed 200 ft. (61 m). Total equivalent length accounts for losses due to elbows or fitting. See the ***Long Line Guideline*** for details.

- The following are the piping sizes.

Table 14 – Pipe Sizes

Indoor Unit	Outdoor Unit	Indoor Unit Tube Sizes (in)		TXV Kit Tube Sizes (in)		Outdoor Unit Tube Size (in)	
		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
40MKCB18C--3	24AHA418 124ANS018	3/8	5/8	3/8	5/8	3/8	5/8
40MKCB34C--3	24AHA424 124ANS024		3/4		3/4		3/4
40MKCB34C--3	24AHA430 124ANS030		3/4		3/4		3/4
40MKCB34C--3	24AHA436 124ANS036		3/4		3/4		7/8
40MKQB34C--3	25HHA424 224ANS024		3/4		3/4		3/4
40MKQB34C--3	25HHA430 224ANS030		3/4		3/4		3/4
40MKQB34C--3	25HHA436 224ANS036		3/4		3/4		7/8

Note: **Both lines need to be insulated using at least 1/2 inch closed foam insulation.**

Refrigerant Charge

Table 15 – Charge Requirements

System Type	Nominal Capacity kBTU/Hr	Outdoor Unit		Indoor Unit	Charge to Sub-cooling Delta from Rating Plate Value
Cooling Only	018	24AHA418A003	124ANS018000	40MKCB18C--3	12
	024	24AHA424A003	124ANS024000	40MKCB34C--3	12
	030	24AHA430A003	124ANS030000	40MKCB34C--3	12
	034	24AHA436A003/5/6	124ANS036000	40MKCB34C--3	8
Heat Pump	024	25HHA424A003	224ANS024000	40MKCB34C--3	14
	030	25HHA430A003	224ANS030000	40MKCB34C--3	11
	034	25HHA436A003/5/6	224ANS036000	40MKCB34C--3	14

The above additional charge is required amount for line lengths up to 25 ft (7.6 m). For line lengths exceeding 25 ft. (7.6 m), additional charge will be required. Refer to the *Residential Long Line Guide*.

Metering Device

The 40MKC(Q)*C unit uses a TXV while the outdoor unit uses a type B accurator. The cooling metering device is installed with the indoor unit. The heating metering device is installed with the outdoor unit. One metering device is required for the cooling only system and two are required for the heat pump systems. Refer to Table 16 for a breakdown of each unit's metering devices.

Table 16 – Metering Devices

System Size kBTU/hr	Cooling Only	Heat Pumps	
	40MKCB**C	40MKQB**C	25HHA4/224ANS
018	TXV	-	-
024	TXV	TXV	0.049"
030	TXV	TXV	0.055"
034	TXV	TXV	0.063"

SYSTEM EVACUATION AND CHARGING

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Never use the system compressor as a vacuum pump.

Refrigerant tubes and indoor coil should be evacuated using the recommended deep vacuum method of 500 microns. The alternate triple evacuation method may be used if the procedure outlined below is followed. Always break a vacuum with dry nitrogen.

SYSTEM VACUUM AND CHARGE

Using Vacuum Pump

1 Completely tighten flare nuts A, B, C, D, connect manifold gage charge hose to a charge port of the low side service valve (see Fig. 17).

2 Connect charge hose to vacuum pump.

3 Fully open the low side of manifold gage (see Fig. 18).

4 Start the vacuum pump.

5 Evacuate using either deep vacuum or triple evacuation method.

6 After evacuation is complete, fully close the low side of the manifold gage and stop the vacuum pump operation.

7 The factory charge contained in the outdoor unit is good for up to 25 ft. (8 m) of line length. For refrigerant lines longer than 25 ft. (8 m), add charge, up to the maximum allowable length, as specified in the residential *Long Line Application Guide*.

8 Disconnect charge hose from charge connection of the low side service valve.

9 Fully open service valves B and A.

10 Securely tighten caps of service valves.

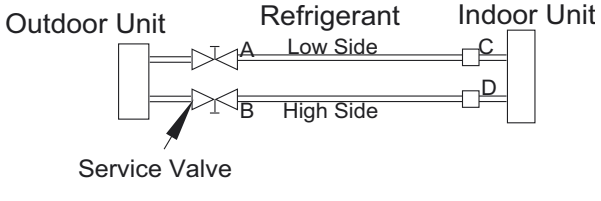


Fig. 17 – Service Valve

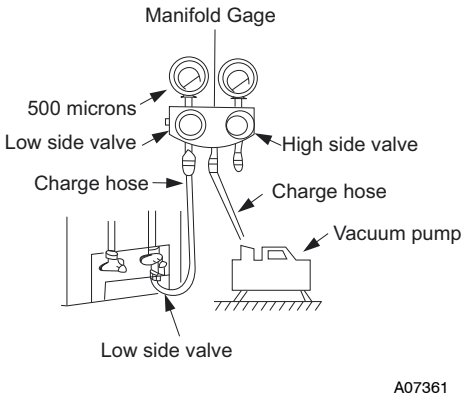


Fig. 18 – Manifold

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water (see Fig. 19).

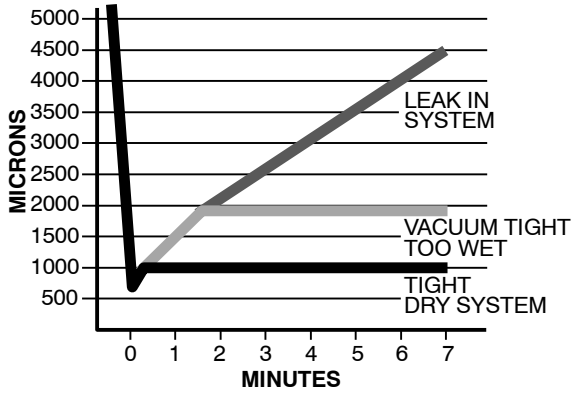


Fig. 19 – Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation method should only be used when vacuum pump is only capable of pumping down to 28 in. of mercury vacuum and system does not contain any liquid water.

Refer to Fig. 20 and proceed as follows:

1 Pump system down to 28 in. of mercury and allow pump to continue operating for an additional 15 minutes.

2 Close service valves and shut off vacuum pump.

3 Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.

4 Close service valve and allow system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system absorbing moisture.

5 Repeat this procedure as indicated in Fig. 20. System will then be free of any contaminants and water vapor.

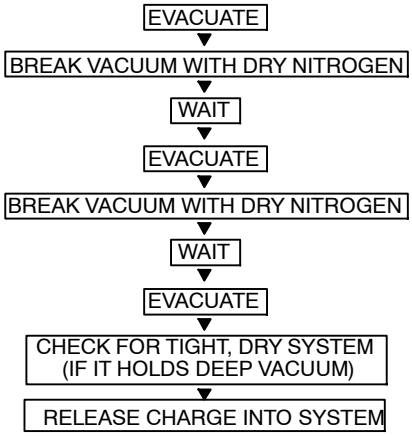


Fig. 20 – Triple Evacuation Method

SEQUENCE OF OPERATION

Interface

A wireless remote control, supplied with the unit, is the interface between the fan coil and the user. The wireless remote control has the following characteristics:

- Capable of displaying °C and °F with °F being the default setting. To change the default setting, refer to the Owner's Manual.
- The remote control setpoint range is from 62°F (17°C) to 86°F (30°C) in increments of 1°F (1°C).
- The wireless remote control has an operating range of 25 ft. (7.62 m).
- The same remote control can be used to control more than one unit.
- If the remote control is lost, damaged, or the batteries are exhausted, the system can be operated by using the manual button (forced Auto) located on the front panel (see Fig. 21).

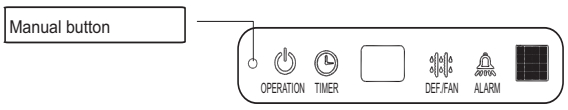


Fig. 21 – Display Panel

TROUBLESHOOTING

This section provides the required flow charts to troubleshoot problems that may arise.

NOTE: **Information required in the diagnoses can be found either on the wiring diagrams or in the appendix.**

Required Tools:

The following tools are needed when diagnosing the units:

- Digital multimeter
- Screw drivers (Phillips and straight head)
- Needle-nose pliers

Recommended Steps

1 Refer to the diagnostic hierarchy charts below and determine the problem at hand.

2 Refer to the chart listed in the diagnostic hierarchy and follow the steps in the chart for the selected problem.

For ease of service, the indoor unit is equipped with diagnostic code display LEDs in the indoor units. This diagnostic display is a combination of flashing LEDs on the display panel or the front of the unit. If possible, always check the diagnostic codes displayed on the indoor unit.

Once a failure occurs with the indoor unit in operation, the green LED on the indoor unit flashes at intervals of 0.5 seconds. The fault code is deduced from the number of times the green LED flashes, blocking unit operation. Between one flash cycle and the next one, a pause of 3 to 4 seconds elapses.

The diagnostic codes for the indoor units are listed in the appendix.

Problems may occur that are not covered by a diagnostic code, but are covered by the diagnostic flow charts. These problems are typical air conditioning mechanical or electrical issues that can be corrected using standard air conditioning repair techniques.

INDOOR UNIT DIAGNOSTIC CODES

Table 17 – Fault Codes

No.	Malfunction	Running lamp	Timer lamp	Defrosting lamp	Alarm lamp	Display (digital tube)
1	Open or short circuit of T1 temperature sensor	X	☆	X	X	E2
2	Open or short circuit of T2 temperature sensor	☆	X	X	X	E3
3	Indoor EEPROM	☆	☆	X	X	E7
4	Water-level alarm	X	X	X	☆	E8
5	Refrigerant leakage detection	☆	X	X	☆	EC

NOTE: O (on) X(off) ☆(flash at 5Hz) ◎(flash at 0.5Hz)

For problems requiring measurements at the control boards please note the following:

For Heat Pump Units Only:

1 Always disconnect the main power.

2 When possible check the outdoor board first.

3 Start by removing the outdoor unit top cover.

4 Reconnect the main power

5 Probe the outdoor board inputs and outputs with a digital multi-meter referring to the wiring diagrams.

6 Connect the red probe to hot signal and the black probe to the ground or negative.

7 Note that some of the DC voltage signals are pulse and gives continuously variable readings.

For Cooling only and Heat Pumps

1 If it is necessary to check the indoor unit board you must start by disconnecting the main power.

2 Next remove the front cover of the unit and then control box cover.

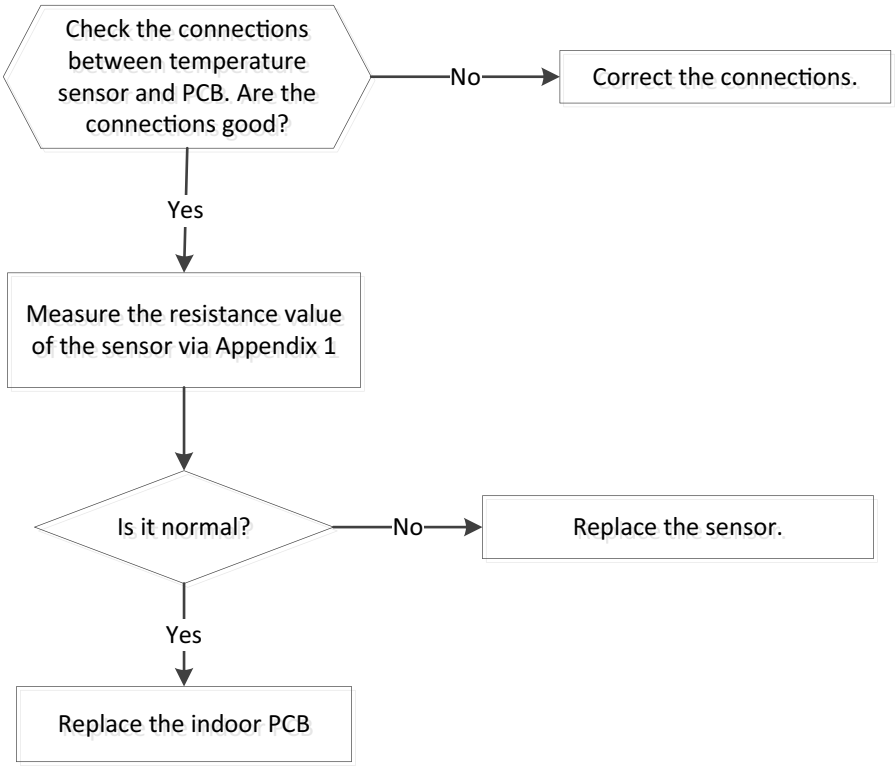
3 Carefully remove the indoor board from the control box, place it face up on a plastic surface (not metal).

4 Reconnect the main power and repeat steps 5, 6, and 7.

5 Disconnect main power before reinstalling board to avoid shock hazard and board damage.

1 – Open or short circuit of T1 or T2 temperature sensor – diagnosis and solution

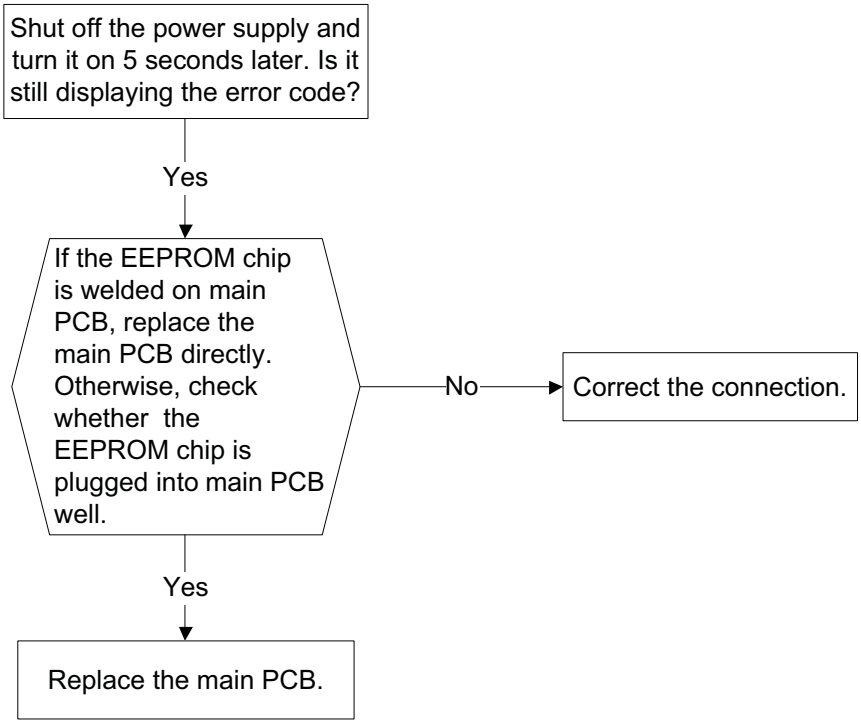
Error Code	E1
Malfunction conditions	Indoor room temperature T1 and sensor evaporator temperature sensor T2 is abnormal



2 – EEPROM parameter error – diagnosis and solution

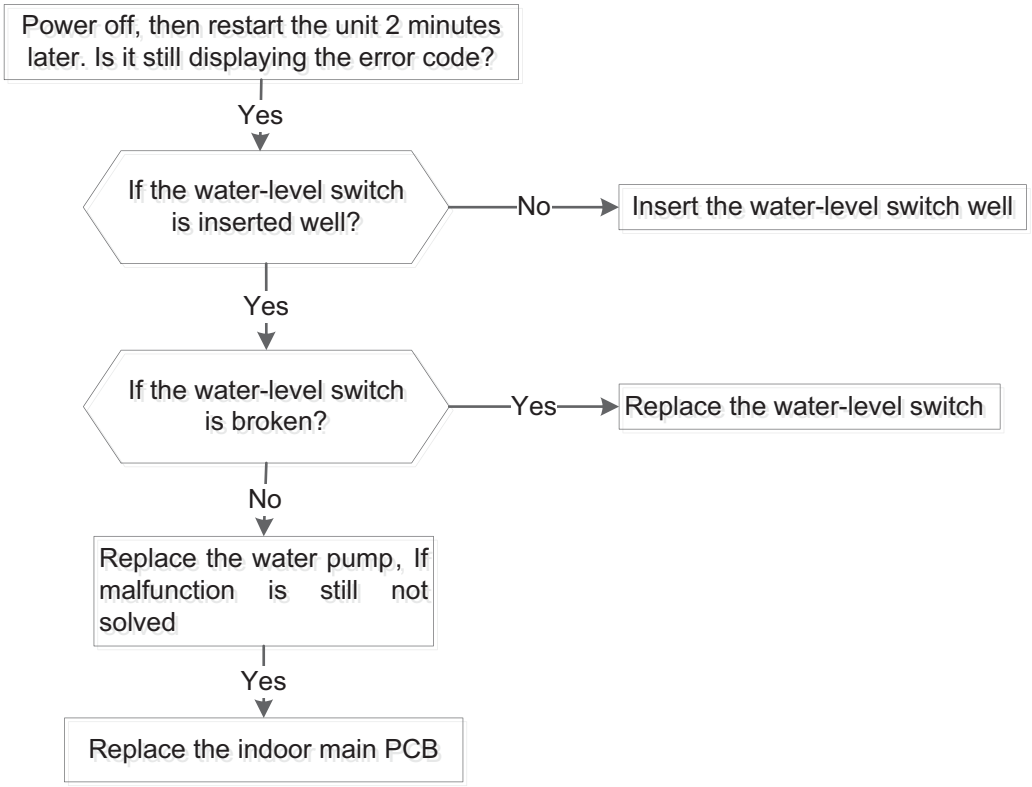
Error Code	E7
Malfunction conditions	Indoor PCB main chip does not receive feedback from EEPROM chip.
Possible Causes	• Installation mistake • Defective PCB

Troubleshooting:


Shut off the power supply and turn it on 5 seconds later. Is it still displaying the error code?
Yes
If the EEPROM chip is welded on main PCB, replace the main PCB directly. Otherwise, check whether the EEPROM chip is plugged into main PCB well.
No
Correct the connection.
Yes
Replace the main PCB.

3 – Water–level alarm – diagnosis and solution

Error Code	E8
Malfunction conditions	If the sampling voltage is not 5V, the LED displays the failure.
Possible Causes	• Wiring mistake • Water–level switch faulty • Water pump faulty • Indoor PCB faulty


Power off, then restart the unit 2 minutes later. Is it still displaying the error code?
Yes
If the water-level switch is inserted well?
No
Insert the water-level switch well
Yes
If the water-level switch is broken?
Yes
Replace the water-level switch
No
Replace the water pump, If malfunction is still not solved
Yes
Replace the indoor main PCB

ADDITIONAL INFORMATION FOR CRITICAL PARTS:

Temperature sensor troubleshooting

Disconnect the temperature sensor from the PCB, and measure the resistance value with a multimeter.

Temperature sensors:

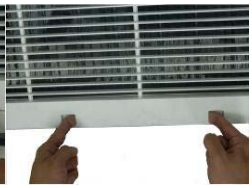
1. Room temperature (T1) sensor,
2. Indoor coil temperature (T2) sensor,
3. Outdoor coil temperature (T3) sensor,
4. Outdoor ambient temperature (T4) sensor,
5. Compressor discharge temperature (T5) sensor

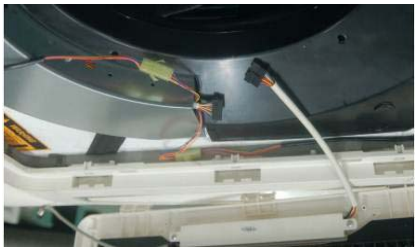
Indoor Fan Motor

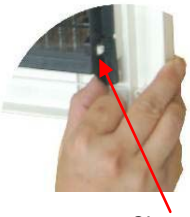
Measure the resistance value of each winding by using the multimeter.

DISASSEMBLY OF CASSETTE INDOOR UNIT

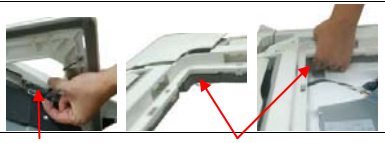
All the operations should be performed after powered off.

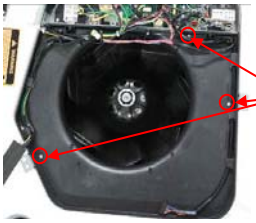
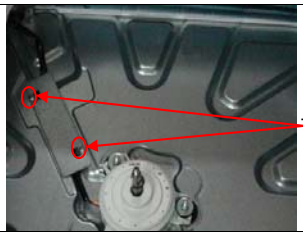
<table>
<tr><th>No.</th><th>Parts name</th><th>Procedures</th><th>Remarks</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Remove the filter</td><td>1) Open the grill
Use two fingers to press the clips on the grille (pic.1), then hitch the grille and open it (pic.2, pic.3)</td><td>
Pic.1
 
Pic.2

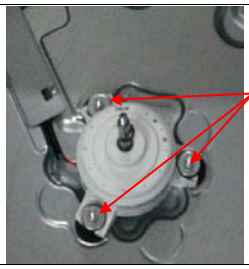
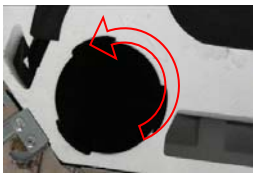
Pic.3</td></tr>
<tr><td>2) Remove the grill
● Disconnect the display board wire connected to the PCB.
● Move the grill up and down to remove the grille.</td><td>
Disconnect the wires between control box and grill
 
Take down the grill from the clasps</td></tr>
<tr><td>3) Remove the filter
Press the filter slightly according to the arrow direction to let filter free from the clasp, then you can take off it.

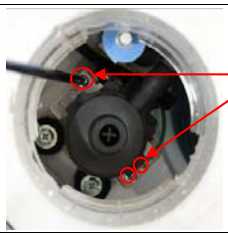
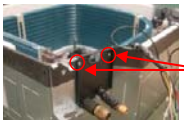
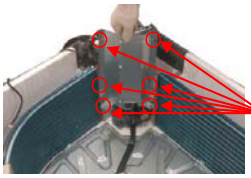
Note: the filter is easy to be damaged, be careful when removing it.</td><td>
Press following the arrow
 
Clasp</td></tr>
</table>

2	**Remove the display board**	**1) Open the grill**	Repeat the operation of step1 of No. 1
		2) Remove the grill In order to prevent the grille falling down, it's necessary to remove it.	Repeat the operation of step2 of No. 1
		3) Disassemble the display board Remove the two screws show in the picture to disassemble the display board	 Two screws
3	**Remove the PCB**	**1) Open the grill**	Repeat the operation of step1 of No.1(No need to remove the panel)
		2) Disassemble the electronic control box cover Remove the 2 screws to disassemble the electronic control box cover	 2 screws
		3) Pull out all the plugs or connectors connected to the PCB	

		4) Remove the PCB from the fixing pins. There are white lines on the PCB to show the position of the pins.	 Fixing pin
4	**Remove the electronic control box**	**1) Open the grill**	Repeat the operation of step1 of No.1(No need to take down the panel)
		2) Remove the electronic control box cover	Repeat the operation of step 2 of No.3
		3) Pull out all the plugs or connectors connected to the electronic control box	
		4) Remove the electronic control box Remove the 3 screws to disassemble the electronic control box	 3 screws
5	**Remove the panel**	**1) Open the grill**	Repeat the operation of step1 of No.1
		2) Remove the grill	Repeat the operation of step2 of No.1
		3) Disassemble the four corner board	 Disassemble the corner board
		4) Loose the fixing screw to free the hooks.	 Screw
		5) Move the four hooks from the clamps, then the panel can be disassembled.	 Hook Hook

6	**Remove the volute shell**	**1) Open the grill**	Repeat the operation of step1 of No.1(No need to take down the panel)
		2) Remove the electronic control box	Repeat the operation of No.4
		3) Screw off the 3 screws to remove the volute shell	
7	**Remover the fan wheel**	**1) Repeat the operation of No.6**	
		2) Remove the hexagon nut to disassemble the fan wheel	
		3) Pull out the fan wheel	
8	**Remove the fan motor**	**1) Repeat the operation of No.7**	
		2) Remove the fixing board of fan motor wire	

		3) **Remove the 3 nuts to disassemble the fan motor**	 3 nuts
9	**Remove the water collector assembly**	1) **Remove the panel**	Repeat the operation of No.5
		2) **Remove the electronic control box**	Repeat the operation of No.4
		3) **Remove the volute shell**	Repeat the operation of No.6
		4) **Screw off the screws to remove the water connector assembly**	
10	**Remove the draining pump**	1) **Rotate the black cover counterclockwise to remove it.**	
		2) **Rotate the transparent cover counterclockwise to remove it with a special tool for it is very tighten.**	
		3) **Take off the fastening belt(or fixing clamp) and disconnect the water pipe**	Fastening belt Water pipe

		4) Screw off the screws to remove the drain pump	
		5) Take out the drain pump	
11	**Remove the evaporator**	**1) Remove the water collector assembly**	**Repeat the operation of No.9**
		2) Remove the seal board of evaporator	
		3) Remove the evaporator fixing board	
		4) Remove the evaporator fixing clamps to disassemble the evaporator.	

APPENDIX

APPENDIX TABLE OF CONTENTS

DESCRIPTION	NUMBER
Control Board Input/Output Values	A1
Temperature Sensor Values (Temperature vs. Resistance) for T1, T2, T3, T4	A2
Temperature Sensor Values (Temperature vs. Resistance) for T5	A3
Display Panel	A4
Temperature Conversion	A5

A1

Table 18 – Control Board Input/Output Value

CONNECTOR	CONTROL BOARD INPUT or OUTPUT VALUE
CN 1	Live wire L1/Null line L2 Input Voltage :AC 230V
CN 17	Controls 24V signal interface(R/C) Input AC 24V
CN111	Signal interface(Y/O) Output 24V AC
CN 8	New fan interface Voltage :AC 230V
CN 6	Connectors interface Output 5V DC
CN 33	Remote alarm interface Only a Contact and no voltage limit
CN 23	Remote switch interface Output 12V DC
CN 13	Pump interface Voltage :AC 230V
CN 14	Swing motor interface Output 12V DC
CN 5	Water level switch interface Output 5V DC
CN 10	Display board interface Output 5V DC
CN 3	Centralized control system Interface Output 5V DC
CN 15	Motor interface Voltage :AC 230V
T1	Room temperature sensor
T2	Pipe temperature sensor
XT 1	3 pole terminal block
XT 2	5 pole terminal block

A2

Table 19 – Temperature Sensor Resistance Value Table for T1, T2, T3, T4

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	115.266	20	68	12.6431	60	140	2.35774	100	212	0.62973
-19	-2	108.146	21	70	12.0561	61	142	2.27249	101	214	0.61148
-18	0	101.517	22	72	11.5	62	144	2.19073	102	216	0.59386
-17	1	96.3423	23	73	10.9731	63	145	2.11241	103	217	0.57683
-16	3	89.5865	24	75	10.4736	64	147	2.03732	104	219	0.56038
-15	5	84.219	25	77	10	65	149	1.96532	105	221	0.54448
-14	7	79.311	26	79	9.55074	66	151	1.89627	106	223	0.52912
-13	9	74.536	27	81	9.12445	67	153	1.83003	107	225	0.51426
-12	10	70.1698	28	82	8.71983	68	154	1.76647	108	226	0.49989
-11	12	66.0898	29	84	8.33566	69	156	1.70547	109	228	0.486
-10	14	62.2756	30	86	7.97078	70	158	1.64691	110	230	0.47256
-9	16	58.7079	31	88	7.62411	71	160	1.59068	111	232	0.45957
-8	18	56.3694	32	90	7.29464	72	162	1.53668	112	234	0.44699
-7	19	52.2438	33	91	6.98142	73	163	1.48481	113	235	0.43482
-6	21	49.3161	34	93	6.68355	74	165	1.43498	114	237	0.42304
-5	23	46.5725	35	95	6.40021	75	167	1.38703	115	239	0.41164
-4	25	44	36	97	6.13059	76	169	1.34105	116	241	0.4006
-3	27	41.5878	37	99	5.87359	77	171	1.29078	117	243	0.38991
-2	28	39.8239	38	100	5.62961	78	172	1.25423	118	244	0.37956
-1	30	37.1988	39	102	5.39689	79	174	1.2133	119	246	0.36954
0	32	35.2024	40	104	5.17519	80	176	1.17393	120	248	0.35982
1	34	33.3269	41	106	4.96392	81	178	1.13604	121	250	0.35042
2	36	31.5635	42	108	4.76253	82	180	1.09958	122	252	0.3413
3	37	29.9058	43	109	4.5705	83	181	1.06448	123	253	0.33246
4	39	28.3459	44	111	4.38736	84	183	1.03069	124	255	0.3239
5	41	26.8778	45	113	4.21263	85	185	0.99815	125	257	0.31559
6	43	25.4954	46	115	4.04589	86	187	0.96681	126	259	0.30754
7	45	24.1932	47	117	3.88673	87	189	0.93662	127	261	0.29974
8	46	22.5662	48	118	3.73476	88	190	0.90753	128	262	0.29216
9	48	21.8094	49	120	3.58962	89	192	0.8795	129	264	0.28482
10	50	20.7184	50	122	3.45097	90	194	0.85248	130	266	0.2777
11	52	19.6891	51	124	3.31847	91	196	0.82643	131	268	0.27078
12	54	18.7177	52	126	3.19183	92	198	0.80132	132	270	0.26408
13	55	17.8005	53	127	3.07075	93	199	0.77709	133	271	0.25757
14	57	16.9341	54	129	2.95896	94	201	0.75373	134	273	0.25125
15	59	16.1156	55	131	2.84421	95	203	0.73119	135	275	0.24512
16	61	15.3418	56	133	2.73823	96	205	0.70944	136	277	0.23916
17	63	14.6181	57	135	2.63682	97	207	0.68844	137	279	0.23338
18	64	13.918	58	136	2.53973	98	208	0.66818	138	280	0.22776
19	66	13.2631	59	138	2.44677	99	210	0.64862	139	282	0.22231

A3

Table 20 – Temperature Sensor Resistance Value Table for T5

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	542.7	20	68	68.66	60	140	13.59	100	212	3.702
-19	-2	511.9	21	70	65.62	61	142	13.11	101	214	3.595
-18	0	483	22	72	62.73	62	144	12.65	102	216	3.492
-17	1	455.9	23	73	59.98	63	145	12.21	103	217	3.392
-16	3	430.5	24	75	57.37	64	147	11.79	104	219	3.296
-15	5	406.7	25	77	54.89	65	149	11.38	105	221	3.203
-14	7	384.3	26	79	52.53	66	151	10.99	106	223	3.113
-13	9	363.3	27	81	50.28	67	153	10.61	107	225	3.025
-12	10	343.6	28	82	48.14	68	154	10.25	108	226	2.941
-11	12	325.1	29	84	46.11	69	156	9.902	109	228	2.86
-10	14	307.7	30	86	44.17	70	158	9.569	110	230	2.781
-9	16	291.3	31	88	42.33	71	160	9.248	111	232	2.704
-8	18	275.9	32	90	40.57	72	162	8.94	112	234	2.63
-7	19	261.4	33	91	38.89	73	163	8.643	113	235	2.559
-6	21	247.8	34	93	37.3	74	165	8.358	114	237	2.489
-5	23	234.9	35	95	35.78	75	167	8.084	115	239	2.422
-4	25	222.8	36	97	34.32	76	169	7.82	116	241	2.357
-3	27	211.4	37	99	32.94	77	171	7.566	117	243	2.294
-2	28	200.7	38	100	31.62	78	172	7.321	118	244	2.233
-1	30	190.5	39	102	30.36	79	174	7.086	119	246	2.174
0	32	180.9	40	104	29.15	80	176	6.859	120	248	2.117
1	34	171.9	41	106	28	81	178	6.641	121	250	2.061
2	36	163.3	42	108	26.9	82	180	6.43	122	252	2.007
3	37	155.2	43	109	25.86	83	181	6.228	123	253	1.955
4	39	147.6	44	111	24.85	84	183	6.033	124	255	1.905
5	41	140.4	45	113	23.89	85	185	5.844	125	257	1.856
6	43	133.5	46	115	22.89	86	187	5.663	126	259	1.808
7	45	127.1	47	117	22.1	87	189	5.488	127	261	1.762
8	46	121	48	118	21.26	88	190	5.32	128	262	1.717
9	48	115.2	49	120	20.46	89	192	5.157	129	264	1.674
10	50	109.8	50	122	19.69	90	194	5	130	266	1.632
11	52	104.6	51	124	18.96	91	196	4.849			
12	54	99.69	52	126	18.26	92	198	4.703			
13	55	95.05	53	127	17.58	93	199	4.562			
14	57	90.66	54	129	16.94	94	201	4.426			
15	59	86.49	55	131	16.32	95	203	4.294			
16	61	82.54	56	133	15.73	96	205	4.167			
17	63	78.79	57	135	15.16	97	207	4.045			
18	64	75.24	58	136	14.62	98	208	3.927			
19	66	71.86	59	138	14.09	99	210	3.812			

A4 Display Panel

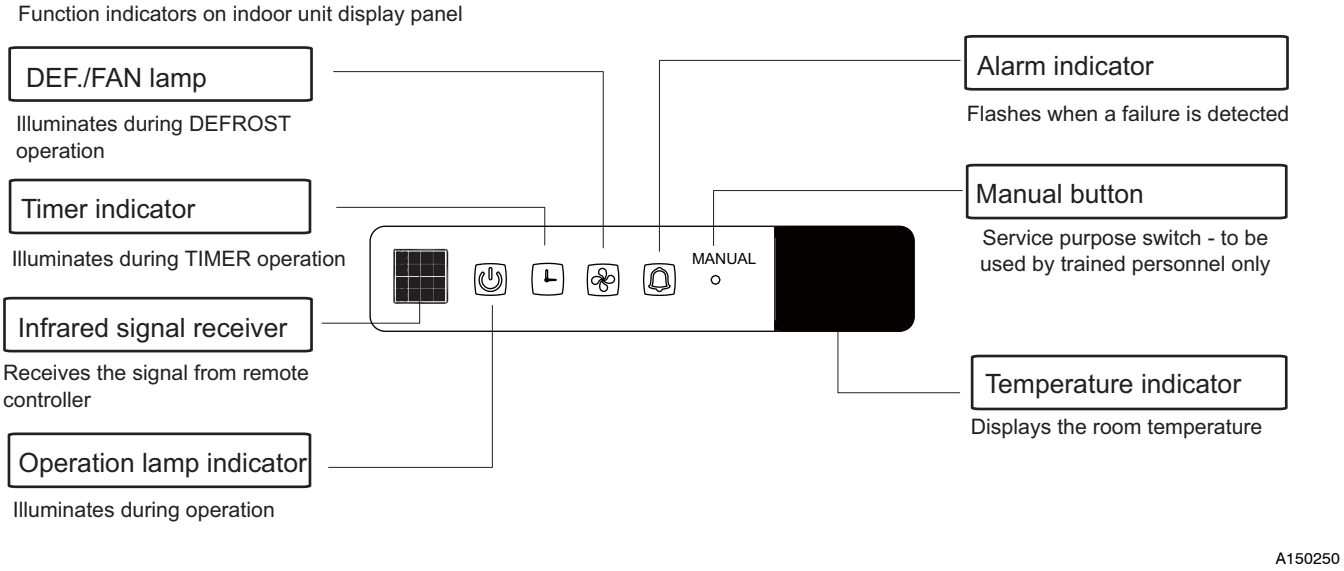


Fig. 22 – Unit Display

A5

Table 21 – Temperature Conversion

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-5	23	21	69.8	51	123.8	82	179.6	113	235.4
-4	24.8	22	71.6	52	125.6	83	181.4	114	237.2
-3	26.6	23	73.4	53	127.4	84	183.2	115	239
-2	28.4	24	75.2	54	129.2	85	185	116	240.8
-1	30.2	25	77	55	131	86	186.8	117	242.6
0	32	25.5	77.9	56	132.8	87	188.6	118	244.4
0.5	32.9	26	78.8	57	134.6	88	190.4	119	246.2
1	33.8	27	80.6	58	136.4	89	192.2	120	248
1.5	34.7	28	82.4	59	138.2	90	194	121	249.8
2	35.6	29	84.2	60	140	91	195.8	122	251.6
2.5	36.5	30	86	61	141.8	92	197.6	123	253.4
3	37.4	31	87.8	62	143.6	93	199.4	124	255.2
3.5	38.3	32	89.6	63	145.4	94	201.2	125	257
4	39.2	33	91.4	64	147.2	95	203	126	258.8
4.5	40.1	34	93.2	65	149	96	204.8	127	260.6
5	41	35	95	66	150.8	97	206.6	128	262.4
6	42.8	36	96.8	67	152.6	98	208.4	129	264.2
7	44.6	37	98.6	68	154.4	99	210.2	130	266
8	46.4	38	100.4	69	156.2	100	212	131	267.8
9	48.2	39	102.2	70	158	101	213.8	132	269.6
10	50	40	104	71	159.8	102	215.6	133	271.4
11	51.8	41	105.8	72	161.6	103	217.4	134	273.2
12	53.6	42	107.6	73	163.4	104	219.2	135	275
13	55.4	43	109.4	74	165.2	105	221	136	276.8
14	57.2	44	111.2	75	167	106	222.8	137	278.6
15	59	45	113	76	168.8	107	224.6	138	280.4
16	60.8	46	114.8	77	170.6	108	226.4	139	282.2
17	62.6	47	116.6	78	172.4	109	228.2	140	284
18	64.4	48	118.4	79	174.2	110	230	141	285.8
19	66.2	49	120.2	80	176	111	231.8	142	287.6
20	68	50	122	81	177.8	112	233.6	143	289.4

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